IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Richard D. Breault et al   Examiner: Ben Lewis

Serial No.: 10/668,869   Art Unit: 1745

Filed: September 22, 2003   Docket No.: C-2789

Title: Internal PEM Fuel Cell Water Management

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Robert M. Darling declares that:

1.   He resides at 301 Abbe Road Extension, South Windsor, Connecticut 06074

2.   He has a PhD degree in Chemical Engineering and has been working in the field of fuel cells and related arts for over 8 years, and is currently engaged in that field on behalf of UTC Fuel Cells, LLC, South Windsor, CT.

3.   He has become familiar with the subject matter of the above-identified application and particularly claims 1, 3, 6, 7, 9-14 and 16-21, including amendments.

4.   He has become familiar with Koch et al U.S. publication 2003/014816 and Cisar et al U.S. publication 2003/0232234.

5.   Amended claims 1 and 20 each require solid plates "interposed between adjacent ones of all' fuel cells in a stack, and "transferring water only internally within" the stack from cathodes to anodes.

6.   Koch uses a coolant water channel 36 to separate the fuel cells; the channel 36 is not solid, as is clear from paragraph 0007, "the present invention exemplifies....The fine porous structure of the cathode plate moves water...into the

coolant water stream." 'Bubble Pressure...allows water transport plate to serve as a gas separator...." (paragraph 0083). Bubble pressure is also mentioned in paragraphs 0090 and 0093. Further, the phrase "separator or water transport plate", indicating a non-solid separator plate, appears in paragraph 40 and in claims 20-40 and 56-68.

7.   Koch transfers water 18 outside the stack; reference to "circulating coolant water stream (coolant water)" is in paragraph 0005. Koch discloses no way to conduct water from cathodes to anodes other than through the water transport plates, which are not solid.

8.   Cisar discloses that water may be conducted through the gas barrier (paragraphs 21, 45 and 61) and in claims 24, 32, 61 and 69. In such a case, the gas barrier is not solid as called for in claims 1 and 20.

9.   Cisar does not disclose any way for water to be conducted from any cathode to any anode except through the non-solid gas barrier.

10.   The two references, taken together, do not suggest a stack of fuel cells (a) having **solid** plates between adjacent cells, and (b) transferring water from cathodes to anodes **only within the stack**; neither reference suggests any way to conduct water from cathodes to anodes except externally of the stack or passing from one cell to an adjacent cell through a water permeable, non-solid separator.
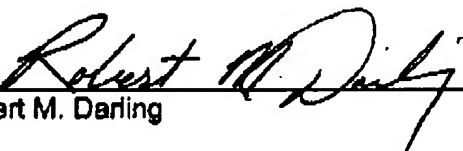
11.   The gas barrier of paragraph 0045 in Cisar does not extend from one water transport plate of one cell to the other water transport plate of the **same** cell, as called for in claim 12 of the subject application.

12.   Cisar does not teach water transfer zones between an edge of one water transport plate of a cell and an edge of the other water transport plate of the same cell as called for in claim 16 of the subject application.

13.   The "membrane" discussed in paragraphs 0016-0018 is the gas barrier, not the proton exchange membrane (PEM); water passes through it from the cathode of one cell to the fuel adjacent the anode of an adjacent cell. Neither of the references suggest anything whatsoever about a high water permeability **PEM** as called for in claim 9 of the subject application, and especially nothing about a PEM with a

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microporous water filled phase in excess of 10 volume %, as called for in claims 10 and 11 of the subject application.

14. All statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Robert M. Darling

December 14, 2006
Date

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